# Virtual Tour

# of

# Maine Minerals

# Introduction

The following tour provides an introduction to some of the minerals found in Maine, the State's mining history, and the hobby of mineral collecting. The localities shown here were selected to illustrate these topics. Most of them are on private property, and in many cases are not open to visitors. Collecting sites that are believed to be open are listed in the guidebook on the Maine Geological Survey website, but please keep in mind that conditions may change from time to time. If in doubt about the status of a locality, it is essential to contact the landowners and determine whether mineral collecting is currently7 allowed, and under what conditions (hours, fees, etc.).

# State Mineral


Photo by G. Freeman

Maine is famous for tourmaline. This is our official State Mineral, though it is actually a group of similar mineral species that vary in composition and color. Two species of the tourmaline group are widespread in the igneous rocks of southwestern Maine. *Schorl* is a black iron-rich variety, and by far the more common of the two. *Elbaite* is a lithium-bearing tourmaline that forms beautiful crystals in pink, green, blue, or combinations of these colors. The pink tourmalines shown here are the base and upper portion of a single spectacular 26-cm crystal found at Mt. Mica in late 2004. For details on the discovery, see the Coromoto Minerals website.

# Pegmatite


Most of the gems and rare minerals in Maine are found in a coarse-grained variety of granite called pegmatite. Veins of pegmatite have intruded older igneous and metamorphic rocks. The typical example shown here contains large masses of milky quartz, pinkish feldspar, and silvery mica. The contact with the surrounding rock is seen in upper-left.

## Greenlaw Quarry


Quarries were opened in the pegmatites of Oxford, Androscoggin, and Sagadahoc Counties in southwestern Maine. They were usually worked for commercial feldspar or sheet mica. Some of the more richly mineralized pegmatites were operated for ores of exotic metals such as beryllium and cesium. Many old quarry pits such as this one on Mt. Apatite in Auburn (Greenlaw Quarry) are now flooded. However, the nearby piles of broken waste rock (dumps) continue to provide interesting mineral specimens to hobbyists.

# Feldspar Processing Mill


Feldspar was the most important industrial mineral produced by Maine pegmatite quarries. The feldspar was trucked to nearby mills for processing and used in making ceramics, scouring powders, and other products. The mill seen here is located in West Paris. It was active from 1925 through the 1960's.

## Microcline Crystal


Some of the common pegmatite minerals are occasionally found as good crystals. Here is an excellent microcline feldspar crystal, still attached to its host rock (matrix), which was uncovered in 1992 by mining at the Aldrich Quarry in Stoneham.

## Beryl Crystals


The majority of pegmatites have simple mineralogy, with collectible minerals limited to a few species such as black tourmaline (schorl), beryl, and garnet (almandine). Crystals of these minerals can be very attractive, as seen in this exposure of beryl crystals in coarse pegmatite at the Songo Pond Quarry in Albany.

## Pollucite


Other pegmatites have crystallized in more complex fashion. They may show zones containing different mineral groupings, or replacement units in which a later generation of minerals has replaced earlier ones as the vein material cooled and solidified. These highly evolved pegmatites often contain cavities (pockets) that may be lined with crystals of gem tourmaline and other desirable minerals. The photo shows a mass of glassy white pollucite discovered at the Emmons Quarry in Greenwood (1995). In the 1920's this rare mineral was a valuable ore of cesium needed for electronic applications.

## Quarry in Georgetown


At the present time there is no feldspar or mica mining in Maine, but some of the old quarries are still being prospected for gem-quality tourmaline and other minerals. This quarry in Georgetown has yielded some good tourmaline, while the pegmatite rock is marketable as crushed stone.

## Songo Pond Quarry


Geologists and mineral collectors come from all over the world to study Maine pegmatites and look for specimens. This group of mineralogists from Moscow, Russia, and the University of Maine are getting a tour of the Songo Pond Quarry from Jan Brownstein.

## Oxford Hills


Many pegmatite localities in western Maine are located in the Oxford Hills region. More or less hiking is required to reach some of them, but the scenery and outdoor exercise are rewarding. If you visit sites that are back in the woods, come prepared with a knapsack or other portable container stocked with food, beverage, and collecting gear. Useful equipment for a trek typically includes rock hammers, short-handled shovel, gloves, eye protection, insect repellent (spring and summer), a magnifier to view tiny minerals, paper to wrap delicate specimens, camera, notebook, and first-aid supplies for cuts (pieces of sharp quartz can easily cut fingers).

## Keith Quarry


Several of the more famous pegmatite quarries are occasionally worked by their owners or lease holders. These operations require costly heavy equipment and blasting to expose fresh rock material. This photo shows one of Maine's famous pegmatite miners, Dudy Groves, at the Keith Quarry on Mt. Apatite (1996).

## No Trespassing


Safety is imperative during mining operations, and the quarry owners usually cannot allow collecting by the public when work is in progress. Active quarries are clearly posted in most cases, and it is essential to respect these signs.

## Tamminen Quarry


The Tamminen Quarry is one of several popular collecting sites in Greenwood that the Perham family has kept open for the public. These are ideal places for the beginner. It is advisable to check with the store first, to ask if mining is in progress at any of their quarries. Some of them are closed for parts of the week during work periods.

## Deer Hill Amethyst Locality


Two well known collecting sites are located in the White Mountain National Forest near the border with New Hampshire. This is the parking and check-in point at the trailhead for the Deer Hill amethyst locality in Stow. A small fee is required at this site, and visitors can deposit payment here and pick up a permit to display on their vehicle. Unlike most other Maine mineral localities, crystals are found by digging in the soil. Hard work and a bit of luck are helpful in finding good specimens.

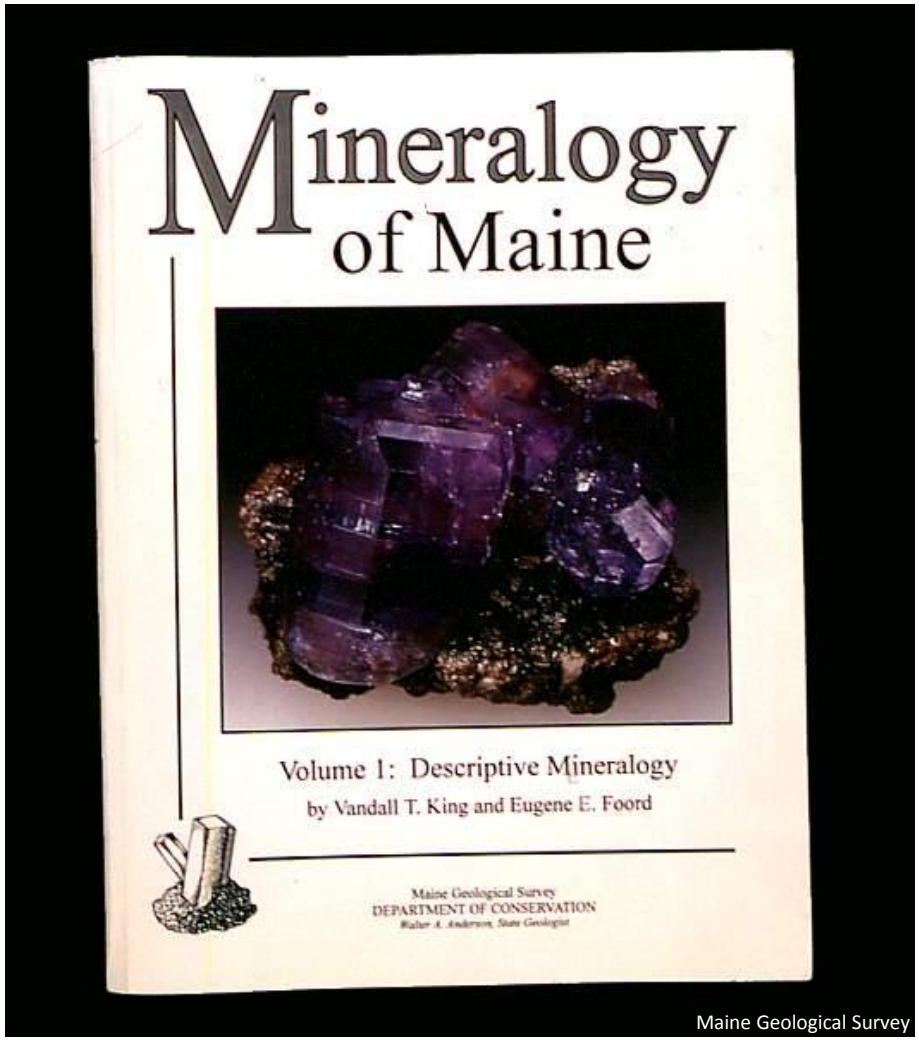
## Lord Hill Quarry


The Lord Hill Quarry in Stoneham is also within the National Forest, but no fee is collected here. Visitors hike to the quarry on an old woods road, and this scenic view of Horseshoe Pond can be enjoyed from the hilltop right behind the quarry pits. Lord Hill is a pegmatite locality formerly worked for feldspar. Bluish-white topaz, smoky quartz crystals, beryl, and tiny crystals of columbite and fluorapatite are among the minerals found here.

# Mount Apatite


Another popular (and free) collecting site is the group of quarries on the east side of Mt. Apatite in Auburn. This area is called Mt. Apatite Park, administered by the City of Auburn. Children can enjoy digging in the rock piles scattered through the woods, but watch out for the vertical cliffs and water-filled holes in some of the quarry pits.

## Mineralogy of Maine



Maine Geological Survey

It takes experience to learn to identify minerals. Useful information is available in books, including the descriptive nature guides available in bookstores. There are also several books describing the minerals and mining history of Maine. Volume 1 of the Mineralogy of Maine describes and illustrates nearly all of the species that have been found in the state, from A to Z. It is available from the Maine Geological Survey, along with Volume 2 covering mining history, gems, and other topics.

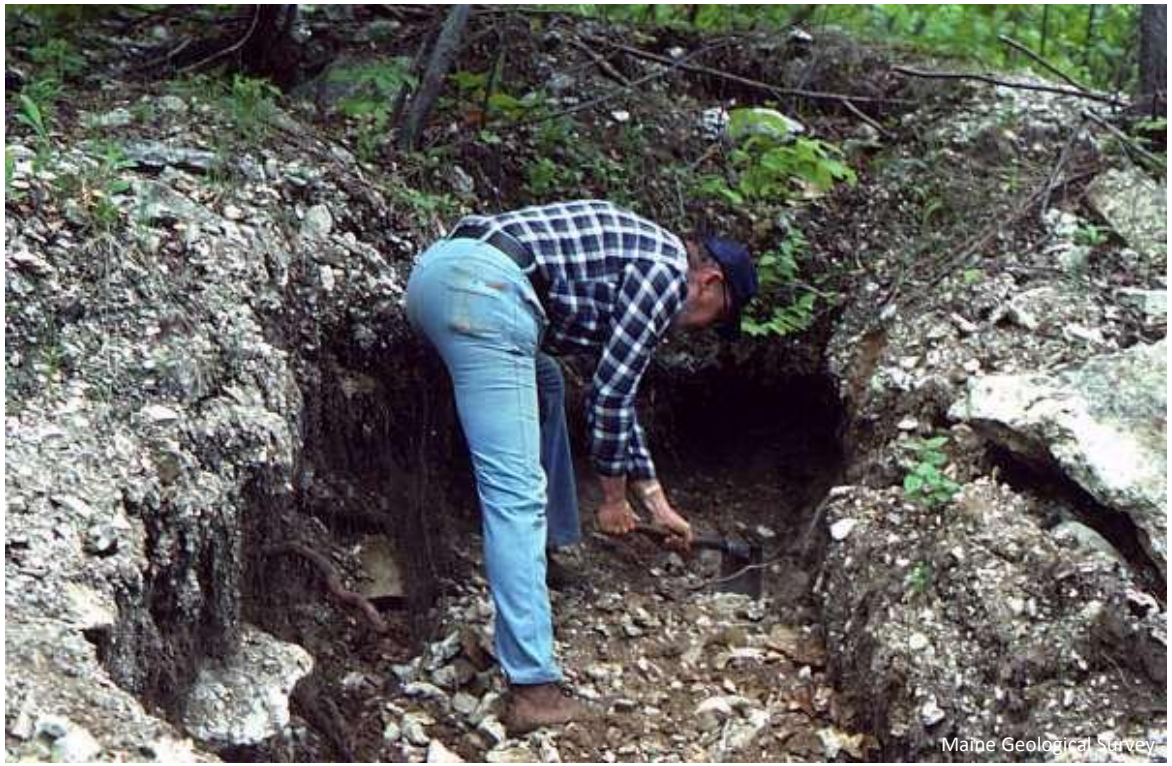
## Museum Display


Museum displays such as this tourmaline exhibit at Harvard University are helpful in learning mineral identification, though they normally include specimens far better than most people find on their collecting trips. You will see more typical specimens in local mineral shops and club shows.

## Mineral Clubs


Sharing of information on field trips is likewise beneficial to the amateur mineral collector. There may be somebody in your group who is very knowledgeable about mineral identification or what minerals to expect from a certain locality. There are several mineral clubs in Maine that have meetings, trips, and shows every year, and you can learn much by joining one of these clubs or a similar group in another state. The collectors shown here are visiting Lord Hill as part of the annual Maine Pegmatite Workshop.

## Waste Dumps




Collectors often dig through the dumps where waste rock was discarded by miners. Most dumps have been superficially scoured by legions of mineral collectors, so it helps to dig into them in search of fresher material. A small shovel with folding blade (like the Army shovel shown here) is useful for this purpose. A crow bar and other tools can move boulders too large to be shoveled. Since the dump material is likely to be coated with dirt, gem hunters use screens and water to sift through the fine debris in search of tourmaline and amethyst fragments.

# Rock Hammers

Gloves and at least two sizes of rock hammers are recommended for breaking and trimming rocks. A regular hammer and a larger crack hammer are shown here. Boulders require a heavy sledge hammer. The nail hammers used by carpenters are too light for most mineral collecting.

## Beryl Crystal in Quartz

An ideal mineral specimen - a beautiful aquamarine beryl crystal in milky quartz from the Barbour Prospect in Stoneham, Maine (1992). Whenever possible, it is best to carefully extract a crystal with some of its matrix still attached. Such a specimen retains more geological history, aesthetics, and value than having just the loose crystal alone.

## Ragged Jack Mountain


Not all collecting sites are quarries. This is the Ragged Jack Mountain locality in Hartford. Pegmatite boulders at the base of the cliff have yielded crystals of chrysoberyl, black tourmaline, and garnet.

## Loring Cove


Ocean beaches may contain interesting minerals. While not as productive as the Bay of Fundy in Nova Scotia, these basalt ledges at Loring Cove in Perry have yielded some agates. Much coastal property is privately owned, so be sure to inquire about access where necessary.

## Dunton Mine


Now we will have a look at some of the recent discoveries of pegmatite minerals in Maine, starting with the 1970's tourmaline strike in Newry. This is a 1976 view of the Dunton Mine, after several large tourmaline pockets had been harvested by Plumbago Mining Corp.

## Dale Sweatt


One of the miners, Dale Sweatt, holding two large tourmaline crystals from the discovery at Dunton Mine in Newry.

# Tourmaline

Harvard University specimen and photo

Tourmaline from the Dunton Mine, Newry. This is a good example of a bicolor crystal, in which the color changes abruptly from green to pink along the length of the crystal.

# Watermelon Tourmaline

Harvard University specimen and photo

Polished slice from a Dunton Mine watermelon tourmaline, for which this locality is noted. Watermelon slices are prized for use in jewelry, especially when they are so perfect and have a complete green rind. The photo also shows the rounded triangular cross-section of the crystal from which the slice was taken.

# Maine Tourmaline Necklace


The State of Maine tourmaline necklace. It was fashioned from Newry tourmalines and gold panned from the Swift River. The Maine Retail Jewelers Association sponsored the necklace and presented it to the Maine State Museum in 1975.

# Bennett Quarry


The Bennett Quarry in Buckfield is another pegmatite deposit which has yielded some fine tourmaline and other rare minerals in recent years.

## Bennett Quarry Crystal Pockets


Paul Bennett examining fresh workings in the Bennett Quarry. The crystal pockets in the background were discovered in the north wall of the quarry in 1990.

## Smoky Quartz Crystal


Giant smoky quartz crystal found at the Bennett Quarry in 1989. This crystal and other Bennett specimens shown here were mined by Ronald and Dennis Holden.

## Pink Tourmaline


Pink tourmaline (15 mm) on quartz crystals, from the 1996 work at the Bennett Quarry.

# Black Tourmaline


A very fine 10-cm black tourmaline (schorl) crystal from the Bennett Quarry in Buckfield.

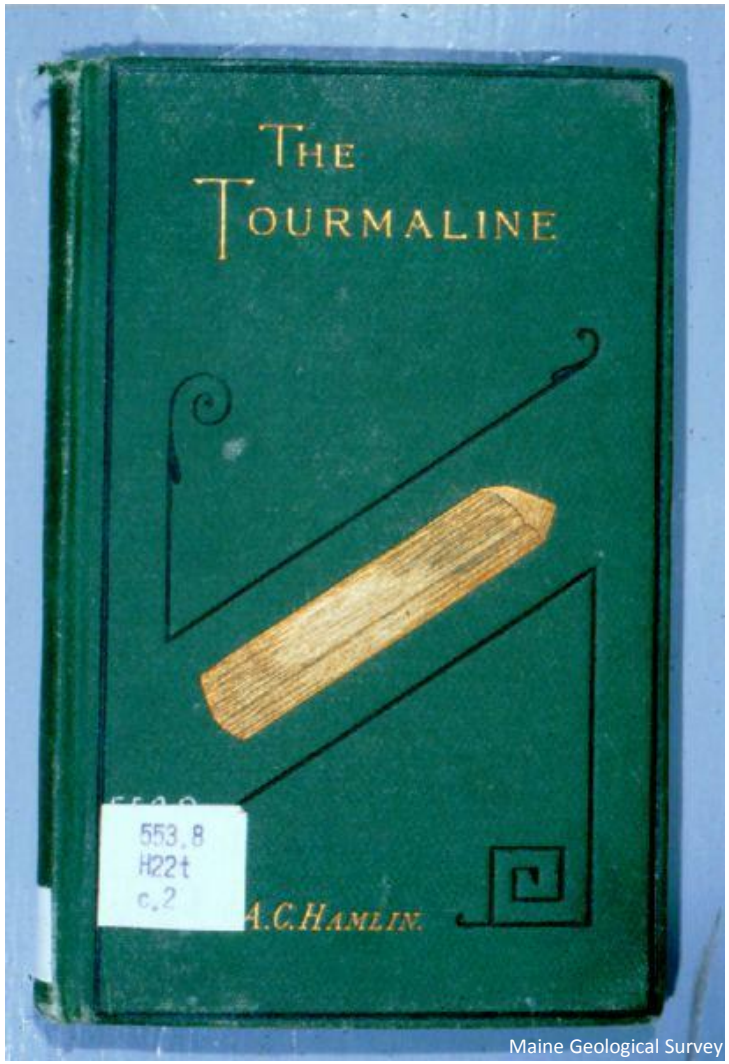
## Rose of Maine


The "Rose of Maine," a huge 30-cm crystal of gemmy orange beryl (variety morganite), on a pegmatite matrix with large quartz crystals. The Holdens discovered this exceptional specimen at the Bennett Quarry on October 7, 1989. It is the largest morganite crystal ever found in North America and yielded many cut gemstones. The largest of these gems (184 carats) is now in the collection of the Maine State Museum. The color of the crystal changed from orange to pink upon exposure to daylight.

# Mount Mica


Mount Mica, near the village of Paris Hill, is home to one of the oldest gem tourmaline localities in the country, having been discovered in 1820. The quarry on Mount Mica has been worked intermittently for over 180 years.

## The Tourmaline by Hamlin




"The Tourmaline" by Augustus Hamlin was published in 1873. This book, and a more detailed volume on Mount Mica that Hamlin published in 1895, include color illustrations of tourmaline crystals found at Mount Mica. High-quality reproductions of the Hamlin books have recently become available, but the originals are still prized by mineral collectors.

# Mount Mica Pockets

Photo from E. S. Bastin, 1911

In the early days at Mount Mica, many tourmaline pockets were found near the surface of the ground. Miners could reach them without needing the heavy equipment available today.

## Mount Mica 2004


The western part of Mount Mica in 2004. Gary Freeman continues to operate this historic mine. It is yielding fine tourmaline crystals that rival the best ever found in the past, along with unusual blue apatites, giant smoky quartz crystals, and other rarities.

# Giant Tourmaline

Photo courtesy of G. Freeman

Mary Freeman holding a giant tourmaline specimen just after its discovery at Mount Mica. Specimens from the tourmaline pockets usually are not colorful and sparkly when they are fresh out of the ground. Cleaning is required at the end of the day to remove coatings of rust and mud from both minerals and miners!

## Cleaned Giant Tourmaline

Photo courtesy of G. Freeman

The same specimen seen in previous photo, after cleaning. It shows a columnar pink and green tourmaline crystal with a matrix of quartz crystals. The shape and color scheme of this crystal resemble a large tourmaline found at Mount Mica by Loren Merrill in 1904 and now in the collection of Harvard University.

## Green and Pink Tourmaline

Photo courtesy of G. Freeman

One of the finest tourmalines found at Mount Mica in 2004. This gemmy green and pink crystal is 19 cm high, on a matrix of white cleavelandite (a platy variety of albite feldspar typically associated with tourmaline pockets).

## Orchard Quarry


The Orchard Quarry in Buckfield surprised the mineral world. This pegmatite quarry formerly was known for its abundant beryl crystals, but they were embedded in solid rock and not gemmy. However, recent (ca. 2000) mining by Gary Freeman yielded remarkable transparent aquamarine and golden beryls. Examples are shown in the next three photos.

# Aquamarine Beryl Crystal


Aquamarine beryl crystal (5 cm) found at the Orchard Quarry.

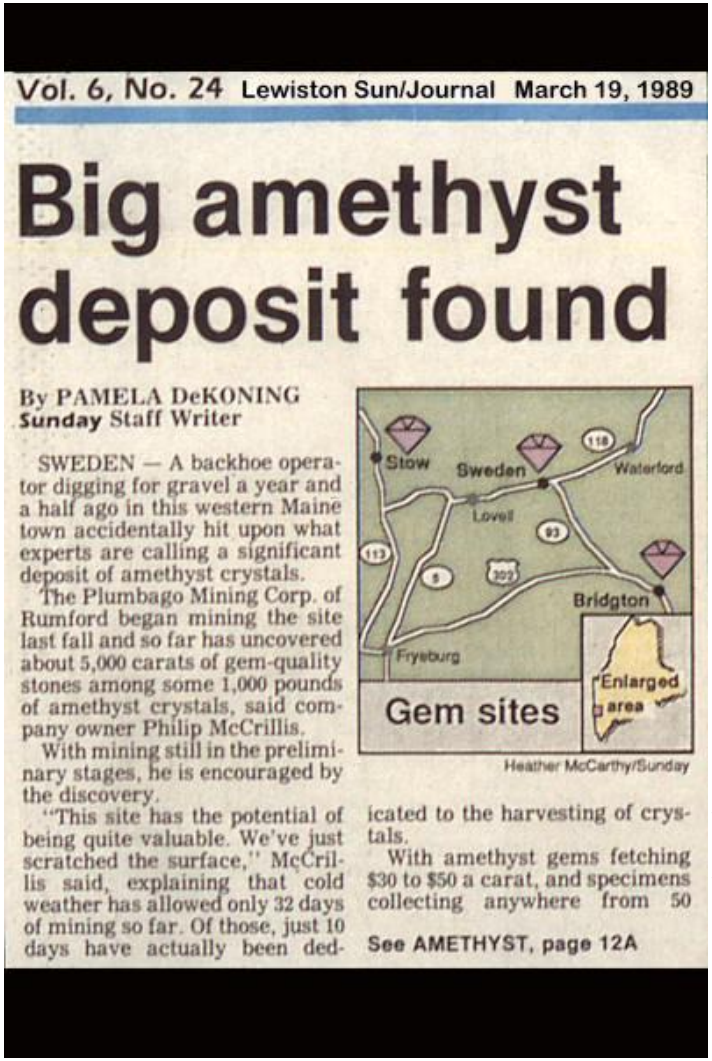
## Golden Beryl


Golden beryl (heliodor) crystal (~ 7 cm) from the Orchard Quarry.

## Beryl on Albite


Superb matrix specimen with beryl crystals on albite crystals, mined in June, 2000, at the Orchard Quarry. The specimen is about 7 cm across.

# Amethyst Article



Vol. 6, No. 24 Lewiston Sun/Journal March 19, 1989

## Big amethyst deposit found

By PAMELA DeKONING
Sunday Staff Writer

SWEDEN — A backhoe operator digging for gravel a year and a half ago in this western Maine town accidentally hit upon what experts are calling a significant deposit of amethyst crystals.

The Plumbago Mining Corp. of Rumford began mining the site last fall and so far has uncovered about 5,000 carats of gem-quality stones among some 1,000 pounds of amethyst crystals, said company owner Philip McCrillis.

With mining still in the preliminary stages, he is encouraged by the discovery.

"This site has the potential of being quite valuable. We've just scratched the surface," McCrillis said, explaining that cold weather has allowed only 32 days of mining so far. Of those, just 10 days have actually been dedicated to the harvesting of crystals.

With amethyst gems fetching $30 to $50 a carat, and specimens collecting anywhere from 50

See AMETHYST, page 12A



Heather McCarthy/Sunday

Lewiston Sun Journal , March 19, 1989

Amethyst (purple quartz) has been found at just a few localities in Maine. In the late 1980's, a chance discovery in the town of Sweden made the news. Plumbago Mining Corporation worked this locality and uncovered many colorful specimens of amethyst crystals on milky quartz crystals.

## Deer Hill


The "Intergalactic" deposit and Eastman Quarry on Deer Hill in Stow have produced large quantities of fine amethyst crystals and transparent gemstock. The amethyst occurs in pockets within pegmatite.

## Fourth of July Pocket


In 1993, partners Dennis Creaser, Gary Howard, and Jay Windover discovered the famous "Fourth of July" amethyst pocket on Deer Hill. This photo shows Gary Howard emerging from the "rabbit hole" with a fine specimen.

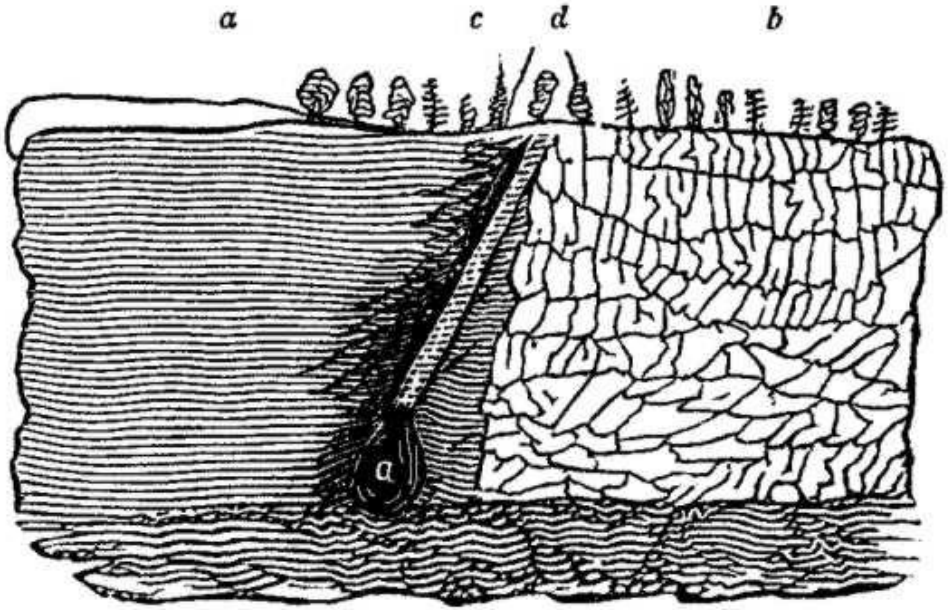
# Amethyst Crystals


Amethyst crystals (8 cm) and a 30-carat faceted gem cut by Creaser Jewelers from the Deer Hill finds of 1993.

# Gold


Maine has many other collectible minerals besides those found in pegmatite. Gold panning is popular in several brooks and rivers. A favorite panning stream is the East Branch of the Swift River in the Byron area. This nugget is one of the largest known from the Swift River. It measures 3.2 x 2.2 x 0.65 cm.

## Lubec Lead Mine Diagram

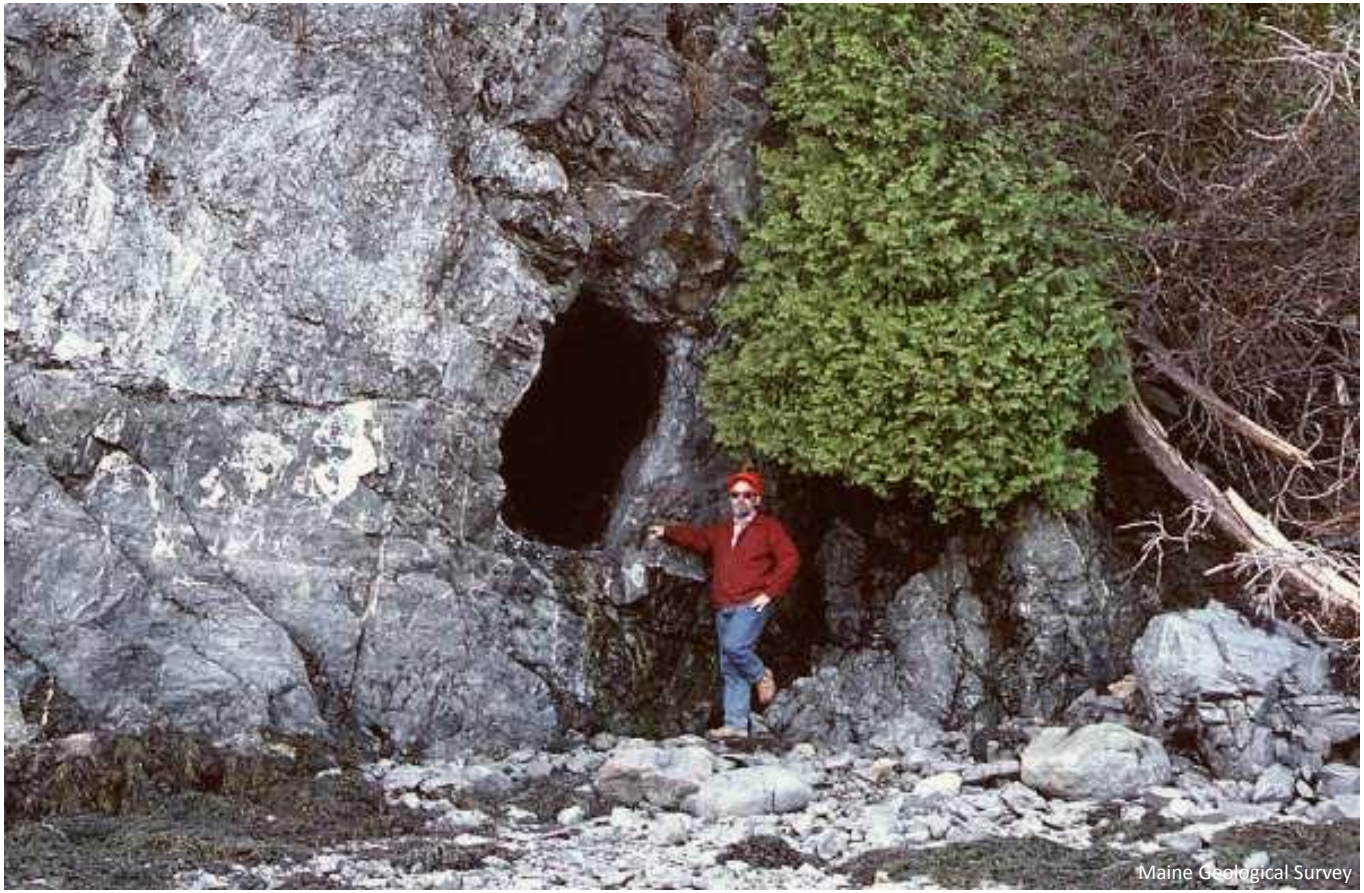



*a* Strata of Argillo-ferruginous limestone.
*b* Dyke of greenstone trap-rock.
*c* Veins of calcareous spar.
*d* Vein of galena and blende.
D Entrance to the drift.

Jackson, 1837

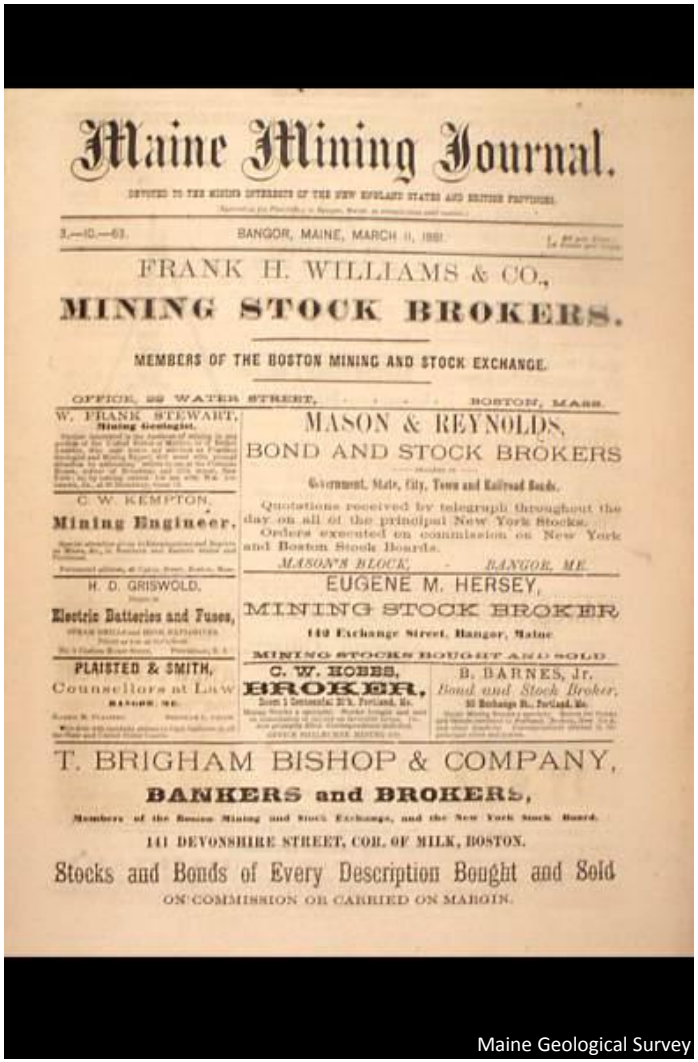
Most metal mines in Maine are very small and have not been worked for a long time. One of the oldest is the Lubec Lead Mine, which was operated in the 1830's. In 1837 the first State Geologist, Charles T. Jackson, published this view of one of the ore veins and mine adits exposed in a cliff along the ocean shore.

## Lubec Lead Mine




Old workings in cliff face at the Lubec Lead Mine. Extreme caution is required to avoid being caught by rising tides in this area.

# Maine Mining Journal


Maine Mining Journal.

DEVOTED TO THE MINING INTERESTS OF THE NEW ENGLAND STATES AND BRITISH PROVINCES.

3.—10.—63. BANGOR, MAINE, MARCH 11, 1881.

FRANK H. WILLIAMS & CO.,

MINING STOCK BROKERS.

MEMBERS OF THE BOSTON MINING AND STOCK EXCHANGE.

OFFICE, 29 WATER STREET, BOSTON, MASS.

W. FRANK STEWART, Mining Geologist.

C. W. KEMPTON, Mining Engineer.

H. D. GRISWOLD, Electric Batteries and Fuses,

PLAISTED & SMITH, Counsellors at Law BANGOR, ME.

MASON & REYNOLDS, BOND AND STOCK BROKERS

Government, State, City, Town and Railroad Bonds.

Quotations received by telegraph throughout the day on all of the principal New York Stocks. Orders executed on commission on New York and Boston Stock Boards.

MASON'S BLOCK, BANGOR, ME.

EUGENE M. HERSEY, MINING STOCK BROKER

110 Exchange Street, Bangor, Maine

MINING STOCKS BOUGHT AND SOLD

C. W. HOBBS, BROKER,

B. BARNES, Jr. Bond and Stock Broker,

T. BRIGHAM BISHOP & COMPANY,

BANKERS and BROKERS,

Members of the Boston Mining and Stock Exchange, and the New York Stock Board.

141 DEVONSHIRE STREET, COR. OF MILK, BOSTON.

Stocks and Bonds of Every Description Bought and Sold

ON COMMISSION OR CARRIED ON MARGIN.

Maine Geological Survey

There was a short-lived mining boom in Maine during the early 1880's. Many prospects were opened in eastern coastal Maine (Hancock and Washington Counties). The miners were searching for deposits of silver and other metals. Few of these ventures actually made a profit, and most traces of the mining activity have been removed or obscured through time. Scattered remnants of mine dumps may yield interesting specimens containing sulfides of iron, copper, zinc, and lead.

## Callahan Mine


The Callahan Mine in Brooksville (seen here) and the Black Hawk Mine in Blue Hill are the only metal mines that were active in Maine during the late 1900's. These deposits were worked by open-pit and underground methods to extract copper and zinc ores.

## Callahan Mine Dumps


The dumps of the Callahan Mine provided good specimens of chalcopyrite (copper ore) and sphalerite (zinc ore), along with other associated minerals.

# Chalcopyrite


Chalcopyrite (4 cm) from the Callahan Mine.

## Blue Kyanite


Metamorphic rocks in southwestern Maine contain several mineral species that may occur in large well-formed specimens. These include crystals of kyanite, andalusite, staurolite, vesuvianite, and garnet (almandine and grossular species). The specimen shown here is bladed blue kyanite from Windham.

# Andalusite Crystal


This giant andalusite crystal (33 cm long) in rock matrix was found in the woods of Standish in 1997 by John Raymond.

## Grossular Garnet


Grossular garnet crystal (2 cm) from the Pitts & Tenney Quarry in Minot.

## Maine Pegmatite Workshop

Photo courtesy of Maine Pegmatite Workshop, 2004

There are special events for those interested in learning more about (and collecting) Maine minerals. One annual highlight is the Maine Pegmatite Workshop, which is a week-long course on pegmatite mineral deposits. Participants come from all over the world to hear talks by experts and visit special localities. This photo shows pegmatite miner Frank Perham pointing out where crystal pockets were found at the Lord Hill Quarry in Stoneham.

## References

Bastin, Edson Sunderland, 1911, Geology of the pegmatites and associated rocks of Maine, including feldspar, quartz, mica, and gem deposits; U. S. Geological Survey, Bulletin 445, 152 p.

Blanding, E. M., and Blanding, W. F. (editors), 1880, Maine Mining Journal; A weekly newspaper devoted to mining, published from January 3, 1880, to September 22, 1882, 28 West Market Square, Bangor, Maine

Hamlin, Augustus Choate, 1873, The tourmaline; Its relation as a gem; its complex nature; its wonderful physical properties, etc., etc.,; with special reference to the beautiful and matchless crystals found in the State of Maine; James R. Osgood and Co., Boston, Massachusetts, 107 p.

Jackson, Charles T., 1837, List of mines and minerals belonging to the Maine Mining Co.; Boston, 16 p.

King, Vandall T., and Foord, Eugene E., 1994, Mineralogy of Maine Volume 1: Descriptive Mineralogy: Maine Geological Survey (Department of Conservation), 418 p.